

REMARKS

Applicants have cancelled claims 1 and 8 without prejudice or disclaimer, added new claims 23-26, and have amended the remaining claims to differently recite the invention. Accordingly, Applicants submit that claims 2-7 and 9-26 are currently pending for consideration.

In the pending Office Action, claims 1-22 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite; claims 1-22 stand rejected under U.S.C. § 103(a) as being unpatentable over Fukuyo et al. (European Patent Application No. 1 338 371, hereinafter “Fukuyo”) in view of Kurosawa et al. (U.S. Patent No. 5,463,202, hereinafter “Kurosawa”); and claims 1-22 stand provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-14 of copending U.S. Patent Application No. 10/585,343, and claims 1-18 of U.S. Patent Application No. 10/585,660. Applicants traverse these rejections, at least for the following reasons.

As for the rejection under 35 U.S.C. § 112, second paragraph, the Office Action asserts that the recitation in the claims of “a/the displacement of a main surface” is unclear. As the present invention relates to processing which relies on the acquisition of the height of the main surface as it may vary along the cutting line, Applicants speculate that it may be more acceptable to the Examiner to use the term “height” in the present claims in place of the previously-recited term “displacement.” Accordingly, Applicants have amended the claims so that each occurrence of the term “displacement” has been replaced with the term “height.” Applicants respectfully submit that this change accords with the description in the instant specification and, at the same time, should address the objection in the Office Action to the recitation of the term “displacement” in the claims.

As for the objection to the term “first measurement step” in claim 3, Applicants have now amended claim 3 to more simply recite “a step.”

As for the alternative request for clarification of the meaning of the phrase “forming a modified region within the object” in the claims, Applicants refer the Examiner to the specification, *e.g.*, paragraphs [0027], [0033], and [0040]. As can be understood from these and other portions of the specification, a laser processing apparatus in accordance with an embodiment of the present invention - see, for example, Applicants’ Fig. 1 - irradiates a planar object to be processed S mounted on a stage 2 with a processing laser beam L1 (first laser beam) such that a converging point P is positioned within the object S, so as to form a modified region R caused by, for example, multiphoton absorption within the object S. The peak power density of the processing laser beam L1 converged by the processing objective lens 42 may be at least 1×10^8 (W/cm²) at the converging point P. In accordance with the present invention, even when the surface S1 of the object S wobbles or otherwise varies in height, for example, the modified region R (caused by multiphoton absorption, for example) can be formed at a position located at a predetermined depth from the surface S1. Forming the linear modified region R within the planar object S as such can generate a cleavage from the linear modified region R acting as a start point, whereby the object S can be cut easily with a high precision along the linear modified region R. Applicants respectfully submit that the recitation of “forming a modified region within the object” is clear and understandable in view of such descriptions within Applicants’ specification.

In view of the foregoing, Applicants respectfully submit that the present claims are now definite and in compliance with the requirements of 35 U.S.C. § 112, second paragraph.

Accordingly, reconsideration and withdrawal of the rejection applied under this section of the statute are respectfully requested.

As for the double patenting rejection, although Applicants do not necessarily agree with this position, Applicants propose to file a terminal disclaimer with regard to each of asserted U.S. Patent Application Nos. 10/585,343 and 10/585,660 upon such time as the asserted obviousness-type double patenting rejection is the only rejection remaining in this case. Applicants submit that filing any terminal disclaimer with respect to these applications at the present time may be premature, given that, for example, the possibility exists that the claims may later undergo further amendments that would eliminate the Examiner's bases for asserting the double patenting rejection.

Having addressed the double patenting rejections and rejections asserted under 35 U.S.C. § 112, second paragraph, the only remaining rejection asserted in the Office Action is the rejection of claims 1-22 under U.S.C. § 103(a) as being unpatentable over Fukuyo in view of Kurosawa. Applicants traverse this rejection, for at least the following reasons.

In this regard, Applicants submit that the applied references to Fukuyo and Kurosawa do not disclose or render obvious the combinations recited in Applicants' method claims requiring a height acquiring step comprising acquiring the height of the main surface along the cutting line while detecting reflected light reflected by the main surface in response to the irradiation of the object by a second laser beam; and a processing step comprising emitting a first laser beam and moving the lens and the object relative to each other along the main surface while adjusting a gap between the lens and the main surface according to the acquired height, so as to form a modified region along the cutting line.

Likewise, Applicants submit that the applied references to Fukuyo and Kurosawa do not disclose or render obvious the combinations recited in Applicants' apparatus claims requiring height acquiring means acquiring the height of the main surface along the cutting line; wherein the control means controls the moving means so as to move the object and the lens relative to each other along the main surface; and wherein, while the first laser beam is being emitted, the control means controls the holding means so as to hold the lens while adjusting a gap between the lens and the main surface according to the height acquired by the height acquiring means, and controls the moving means so as to move the lens and the object relative to each other along the main surface, thereby forming the modified region.

Addressing the Examiner's comments in the pending Office Action, Applicants respectfully submit that the primary reference to Fukuyo merely discloses that according to the focal point data, the stage controller 115 moves the Z-axis stage 113 in the Z-axis direction (S109); that as a consequence, the focal point of visible light from the observation light source 117 is positioned at the surface 3; and that, according to the movement amount data, the stage controller 115 causes the Z-axis stage 113 to move the object 1 in the Z-axis direction at a position where the light-converging point P of laser light L is located within the object 1 (S111). See, for example, paragraphs [0146] through [0151] of Fukuyo.

Applicants submit that such descriptions indicate the Fukuyo merely decides the initial position of the converging point of the laser beam against the main surface of the object, and that this is very different from the subject matter recited in Applicants' claims, in which, after the initial position of the converging point of the first laser beam is determined, an additional, ongoing process for positioning the converging point is carried out based on the acquired height of the main surface of the object as it varies along the length of the cutting line. Applicants

respectfully submit that this type of additional process is not taught, and would not have been rendered obvious, by Fukuyo and/or Kurosawa.

With particular reference to method claim 2, the Office Action appears to reference paragraph [0304] of Fukuyo. However, Applicants submit that paragraph [0304] of Fukuyo only describes that, upon the magnitude of distance between adjacent modified spots, a speed calculating section 149 calculates a stage moving speed for attaining this magnitude of distance. Nonetheless, importantly, it does not describe anything relating to the subject matter recited in Applicants' claims of acquiring the height of the main surface of the object along the cutting line and adjusting the gap between the lens and the main surface according to the acquired height.

With reference to remaining independent claims, including current independent claims 3 and 4, the Office Action appears to rely at least in part on Fig. 15 of Fukuyo. However, Applicants submit that Fig. 15 of Fukuyo merely describes determination of the initial position of the converging point of a laser beam against the main surface of the object and does not at all describe anything regarding the above-discussed additional, ongoing process for positioning the converging point that is carried out based on the acquired height of the main surface of the object as it varies along the length of the cutting line.

Nor does the secondary reference to Kurosawa make up for any of the aforementioned deficiencies noted in the primary reference to Fukuyo.

Accordingly, for at least the foregoing reasons, Applicants submit that the applied references of record do not render the subject matter recited in any of the independent claims, or any of the claims depending on the independent claims, unpatentable under U.S.C. § 103(a). Thus, all of the pending claims are considered to be patentably distinguishable over the applied

references of record, and reconsideration and withdrawal of the rejections set forth in the pending Office Action is respectfully requested. A favorable action is earnestly solicited.

CONCLUSION

In view of the foregoing, Applicants submit that the pending claims are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution. A favorable action is awaited.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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